

Freshwater accounts at river basin scale in Peloponnese, Greece

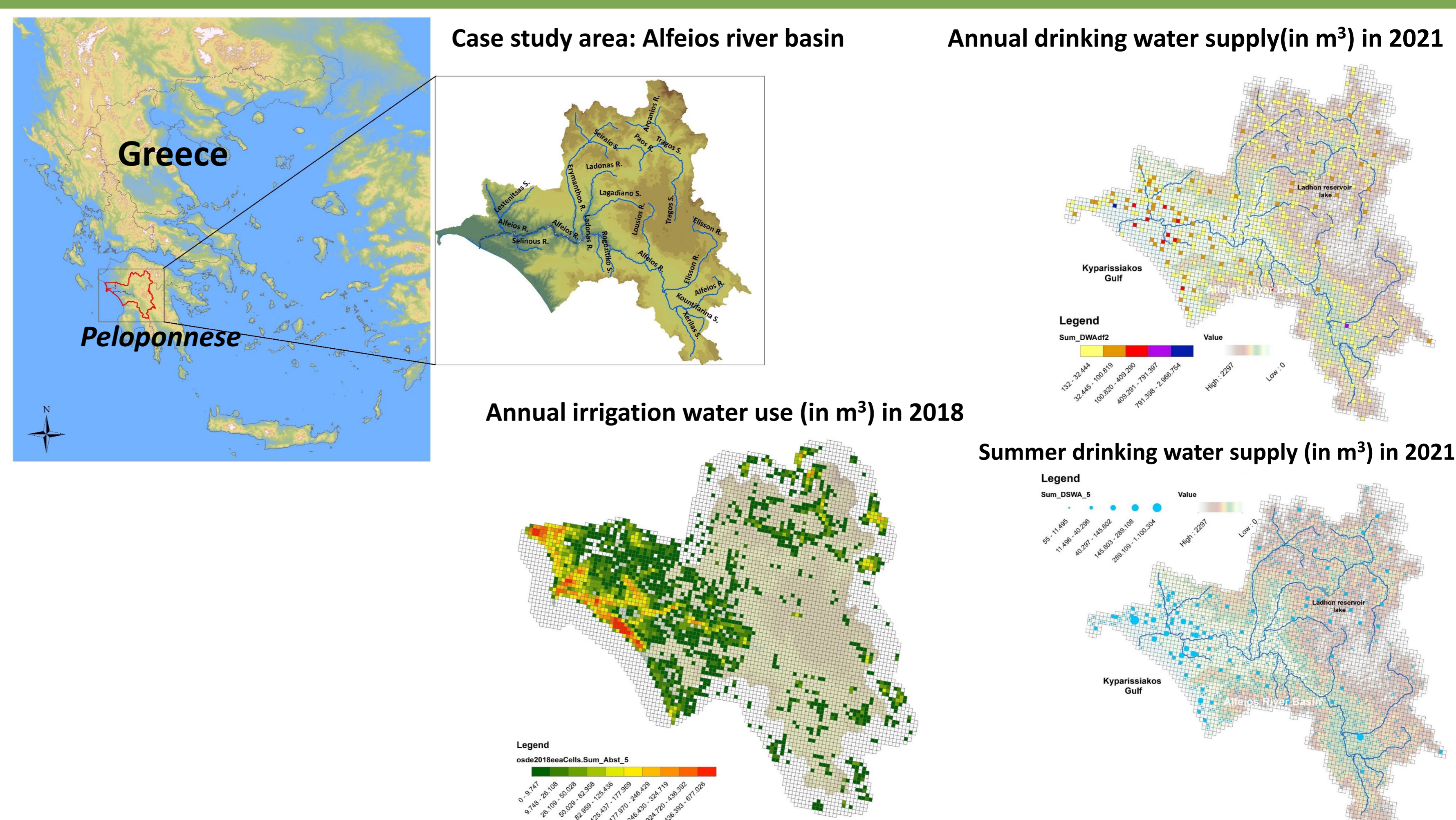


Introduction

According to the EU's Water Framework Directive (WFD) reporting obligations, Greece has completed two River Basin Management Plans (RBMP) updates. These reports provide a wealth of spatial and temporal datasets for water resources. The System of Environmental-Economic Accounts for Water (SEEA-Water) enables the connection between water ecosystems and the economy and utilise such water-relevant datasets. In this work, the SEEA-EA framework applies on freshwater resources, surface and groundwater, in terms of (a) extent accounts, (b) condition accounts, (c) supply and use of provisioning ecosystem services, focusing on drinking and irrigation water supply and use accounts for selected years from 2010 to 2021 depending on the availability of complete and reliable data. The case study for applying the water ecosystem accounts is the Alfeios river basin in Western Peloponnese, Greece.

Objectives

- Implementation of SEEA-EA framework for freshwater ecosystems, including rivers, lakes and groundwaters at river basin scale
- Extent accounts
- Condition accounts
- Drinking water supply and use accounts
- Irrigation water supply and use accounts



Methods

- We follow the methodological framework proposed in SEEA-EA.
- For the water accounts expressed in spatial units, we use the EEA reference grid for Greece with cell size 1×1 km².
- The spatial analysis is undertaken in ArcMap 10.8.
- Datasets from the two reporting WFD cycles, Corine LU/LC, Population census, Eurostat Water database, IACS geodatabase, JRC Global Surface Water, FADN standard output, Hellenic Statistical Authority.

Results

- Extent accounts at MAES level 3, identifying rivers, lakes and groundwater bodies from 1990 to 2018 and changes in lakes seasonality between 1984 and 2020.
- Condition accounts based on the freshwater condition, i.e (i) ecological condition reported for river and lake water bodies & (ii) chemical, quantitative & total condition for groundwater bodies, with opening period (2009-2015) and closing period (2016-2021).
- Drinking water supply and use maps in biophysical and monetary terms, as well as summary accounting tables at river basin level, from 1991 to 2021. Valuation based on average financial cost per m³ of supplied water since there is no competitive market.
- Annual irrigation water supply and use maps in biophysical and monetary terms, as well as summary accounting tables at river basin level from 2015 to 2018. The residual valuation method utilised the agricultural area from IACS, the standard output per cultivation from FADN and regional agricultural accounts coefficients.

Analysis

Surface and groundwater bodies do not show any significant change as concerns extent. A barely noticeable overall negative trend is observed in the river ecological condition and no change to groundwater condition. In the Alfeios River basin, the use value for drinking water in 2021 is approximately six million Euros, and the use value for irrigation water in 2018 is close to 29 million. The results are experimental (tentative), considering the number of necessary assumptions and the absence of detailed information.

Conclusion

The officially registered national and European datasets can serve as good initial basis for mapping and compiling water ecosystem accounting at national and local scale in Greece. The future WFD reporting cycles of the river basin management plans could be structured in a way to enable a better and a more direct connection of the provided dataset to ecosystem accounts.

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